DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department of Curriculum Management
Educational Assessment Unit

Track 3

Annual Examinations for Secondary Schools 2014

FORM 4 MATHEMATICS TRACK 3 MARKING SCHEME

Notes for Marking of Scripts

Types of Marks

- **M**(ethod) marks are awarded for knowing a correct method of solution and attempting to apply it. Method marks cannot be lost for arithmetic mistakes. They can only be awarded if the method used would have led to the correct answer had not an arithmetic mistake been made. In general a correct method is implied by a correct answer and therefore **when a correct answer is given and no work is shown, no method marks are lost**.
- **A**(ccuracy) marks are given for correct answer only (c.a.o.) Incorrect answers, even though nearly correct, score no marks. Accuracy marks are also awarded for incorrect answers which are correctly followed through (f.t.) from an incorrect previous answer, **provided that f.t. is indicated in the marking scheme**. No method (M) or accuracy (A) marks are awarded when a wrong method leads to a correct answer.
- **B** marks are accuracy marks awarded for specific results or statements independent of the method used.

Misreading

M marks can still be earned (unless that part of the question is trivialized) but the final A marks are lost.

Crossed out working

An answer or working that is crossed out and not replaced is marked as if it was not crossed out. If the answer or working is replaced, then the crossed out answer or working is ignored and should not be considered for marking.

Units

In general, missing or inaccurate units are not penalised unless otherwise indicated in the marking scheme.

Other

- Incorrect working or statement following a correct answer is ignored.
- Marks are not sub-divisible; no half marks may be awarded.
- Other abbreviations used:
  - o.e. (or equivalent)
  - e.e.o.o. (each error or omission)
- Markers are advised to indicate the M, A or B marks awarded in the body of the script and then write their total in the margin. The total mark for each question should be written in the table included at the top of page 1 of the main paper. This measure facilitates the moderation of papers.

Non Calculator Paper (20 marks)

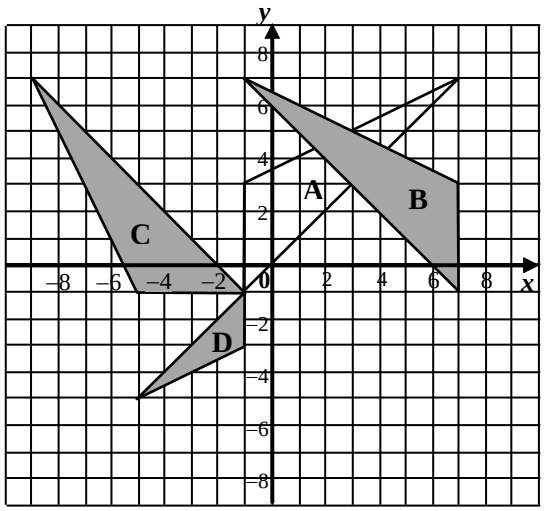
Each question carries **one** B mark except for question no. 18 which carries **two** B marks.

No. 1	No. 2	No. 3	No. 4	No. 5
3.5×10^{-4}	–5	60	10	**B** or 200
No. 6	**No. 7**	**No.8**	**No. 9**	**No. 10**
1	$\frac{3ab^3}{4}$	9600	2	22
No. 11	**No. 12**	**No. 13**	**No. 14**	**No. 15**
2.1×10^5	Any three numbers whose mean is 7	$\frac{2p}{q}$	2	C or ABCD has rotational symmetry of order 2
No. 16	**No. 17**	**No. 18**	**No. 19**	
$2x^2 + 7x - 15$	**LT 60**	(a) $40 < \boldsymbol{A} \leq 60$ (b) $20 < \boldsymbol{A} \leq 40$	**C**	

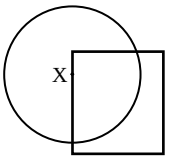
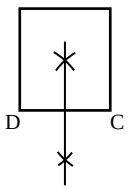
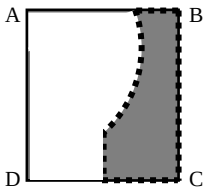
Main Paper (80 marks)

Quest.		Requirements	Marks		Additional Guidance
1	a)	Shape No. | 1 | 2 | 3 | 4 | 5 Perimeter | | | **11** | **14** | **17**	B2	7	(–1 e.e.o.o.)
	b)	(i) 32 (ii) $3n + 2$	B1 M1 A1		
	c)	Sarah is correct Working: $3n + 2 = 47$ $n = 15$ Shape 15 has a perimeter of 47 cm or value of n is a whole number	B1 M1		Stating 'Correct' Valid reason or working
2	a)	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 0.5^3 = 0.261799\ldots$ $= 0.26\ \text{m}^3$	M1 A1	5	Correct substitution Ignore rounding
	b)	Volume of concrete = vol of cylinder – vol of hemisphere $= (\pi \times 0.85^2 \times 0.6) - 0.261799\ldots$ $= 1.36188\ldots - 0.261799\ldots$ $= 1.10\ \text{m}^3$	M1 M1 A1		Correct volume of cylinder Subtracting volume of hemisphere f.t. Ignore rounding

3	a)	(i) Error: $x^2 + 13x$ **+ 12** $= 0$ (ii) Solution: $9 + x^2 + 20x = 7x - 21$ $x^2 + 13x + 30 = 0$ $(x + 3)(x + 10) = 0$ $x = -3 \quad x = -10$	B1 M1 M1 A1	10	Identifying Error Collecting like terms Correct factors Both correct
	b)	$3(x + 3) - 4(x + 2) = 6$ $3x + 9 - 4x - 8 = 6$ $x = -5$	M1 M1 A1		Eliminating denominator Simplifying
	c)	$\frac{A}{2\pi r} = r + h$ OR $A = 2\pi r^2 + 2\pi rh$ $\frac{A}{2\pi r} - r = h$ $A - 2\pi r^2 = 2\pi rh$ $h = \frac{A}{2\pi r} - r$ $h = \frac{A - 2\pi r^2}{2\pi r}$	M1 M1 A1		
4		$x = \frac{3 \pm \sqrt{9 - (4 \times 2 \times -4)}}{4}$ $x = \frac{3 \pm \sqrt{9 + 32}}{4} = \frac{3 \pm \sqrt{41}}{4}$ $x = 2.35$ or $x = -0.85$	M1 A1 A1	3	Correct substitution in formula or using completing the square
5	a)	$\frac{12}{36}$ $\left(\text{or } \frac{1}{3}\right)$, $\frac{23}{35}$, $\frac{24}{35}$, $\frac{11}{35}$ in correct place	B1 B1	7	Any **two** entries correct All entries correct
	b)	(i) $\frac{24}{36} \times \frac{23}{35} = \frac{46}{105}$ (ii) $\left(\frac{24}{36} \times \frac{12}{35}\right) + \left(\frac{12}{36} \times \frac{24}{35}\right)$ $= \frac{16}{35}$	M1 A1 M1 M1 A1		f.t. Multiplying probablilities along a branch Adding probabilities f.t.
6	a)	(i) **3** (ii) Correct marking of point **A**(4, 3) and completion of graph	B1 B1	8	
	b)	<table><tr><td>***x***</td><td>–2</td><td>1</td><td>4</td></tr><tr><td>***y***</td><td>**3**</td><td></td><td>**0**</td></tr></table>	B1 B1		Correct entries Correct graph
	c)	$x = -0.9$ $y = 2.4$ (±0.2) and $x = 3.4$ $y = 0.3$ (±0.2)	A1 A1		f.t. for incorrect straight line f.t. for incorrect straight line
	d)	Line **A** Valid reason e.g. Line A passes below the curve as its y-intercept is –5	B1 B1		Award mark **only** if valid reason is given

7		$A = P\left(1 + \frac{r}{100}\right)^n$ $3600 = 3000\left(1 + \frac{5}{100}\right)^n$ $1.2 = 1.05^n$ $n = 4$ years	M1 M1 A1	3	Correct substitution in formula and simplifying or any other valid method
8	a)		B1	6	**Triangle B** Labelling not penalised
	b)		M1 A1		**Triangle C** Valid attempt Accurate drawing Labelling not penalised
	c)		M1 A1		**Triangle D** Valid attempt Accurate drawing Labelling not penalised
	d)	D	B1		
9	a)	**Angle *a*** = 30° ΔOQP is isosceles or OQ = OP **Angle *b*** = 146° Valid reason given or correct working shown **Angle *c*** = 107° Valid reason given or correct working shown	B1 B1 A1 M1 A1 M1	8	f.t. f.t.
	b)	$O\widehat{R}Q = 43°$ *base angles of isosceles triangle* $O\widehat{R}T = 90°$ *angle between radius and tangent* $Q\widehat{R}T = 90° - 43° = 47°$	M1 M1		

10	a)	Correct use of Sine, Cosine or Tangent $A\widehat{O}C = 53.13 \ldots °$ $A\widehat{O}B = 2 \times 53.13 \ldots ° = 106.3°$	M1 A1	10	

	b)	Area of sector = $\frac{106.3\ldots}{360} \times \pi \times 2.5^2$ $= 5.7955\ldots$ Area of $\Delta AOB = \frac{1}{2} \times 4 \times 1.5 = 3$ Area of step = $5.7955\ldots - 3 = 2.7955\ldots$ $= 2.796\ m^2$	M1 M1 A1		Correct area of sector Subtracting area of triangle Ignore rounding
	c)	Area of deep part $= (\pi \times 2.5^2) - 2.7955$ ... $= 16.8393\ldots$ $= 16.84\ m^2$	 M1 A1		 Ignore rounding
	d)	Volume of water $= (2.7956\ldots \times 0.2) + (16.8393\ldots \times 0.4)$ $= 7.2948\ldots\ m^3$ = 7295 litres	 M1 A1 A1		 f.t.
11	a)	(i) Tan 35° = $\frac{AB}{42}$ AB = 42 × Tan 35° = 29.4087… m AB = 29.409 m (ii) Using Pythagoras Theorem $28^2 = 22^2 + DE^2$ DE = $\sqrt{28^2 - 22^2}$ = 17.3205… m DE = 17.321 m	M1 A1 M1 M1 A1	8	Correct substitution Ignore rounding Correct substitution DE subject of the formula Ignore rounding
	b)	EF = 42 – 17.3205… = 24.6794… FG = 29.4087… + 50 + 22 = 101.4087… Tan $\hat{G} = \frac{EF}{FG} = \frac{24.6794...}{101.4087...}$ = 0.2433… $\hat{G}$ = 13.6779…° = 13.7°	M1 M1 A1		Finding EF and FG f.t. for incorrect AB and DE
12	a)	Construction of circle centre X, radius 6 cm 	B1	5	
	b)	Construction of perpendicular bisector of line CD 	M1 A1		
	c)	Correct area shaded 	B2		Do not penalise if lines are not broken